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AFOEHL REPORT 90-174EQ00093HHB



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Medical Waste Technical Assistance Survey
Keesler AFB MS

LINDA B. ALBRECHT, Captain, USAF, BSC

October 1990

Final Report

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AF Occupational and Environmental Health Laboratory (AFSC)
Human Systems Division
Brooks Air Force Base, Texas 78235-5501

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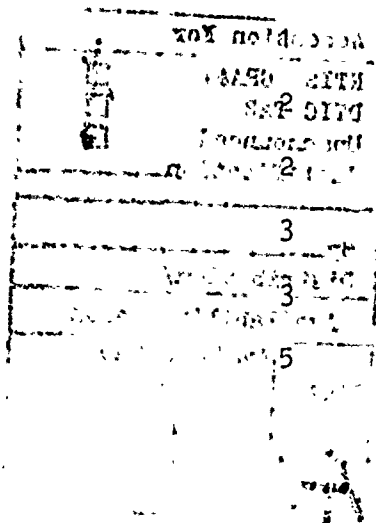
The author greatly appreciates the support and assistance from the other team members, Major Terry Childress and Lieutenant Nancy Hedgecock. Their technical assistance and hard work were vital to the completion of this survey.

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Contents

	Page
Standard Form 298	i
Acknowledgments	iii
I. Introduction	1
II. Discussion	
III. Procedures	
IV. Results and Discussion	
V. Summary of Waste Disposal Practices	
VI. Observations	
VII. Recommendations	
VIII. Conclusions	
References	
Appendix	
A Request Letter	9
B Section Survey Form	13
C Facility Manager Survey	25
D Summary of Infectious Waste by Type	31
E Summary of Waste Training	35
F Section Activities and Waste Disposal Practices	39
Distribution List	49



I. INTRODUCTION

On 19 Jan 1990, Keesler Medical Center, Keesler Air Force Base (KAFB) MS requested through HQ ATC/SGPB that the Air Force Occupational and Environmental Health Laboratory (AFOEHL) perform a hazardous and medical waste survey of their hospital (see Appendix A). Base personnel were particularly concerned with RCRA regulated waste disposal practices.

Maj Childress, Capt McMullen, and Lt Hedgecock conducted a presurvey from 29 Jan to 30 Jan 1990. This presurvey evaluated AFOEHL's ability to support Keesler's request for hazardous and medical waste disposal assistance.

Maj Childress, Capt Albrecht, and Lt Hedgecock returned to Keesler Medical Center to conduct the hazardous and medical waste survey on 26 March 1990. The scope of this survey was to evaluate Keesler AFB Medical Center's medical and hazardous waste management practices from the point of generation to their ultimate disposal. The survey also addressed areas of regulatory compliance, program effectiveness, and waste minimization.

II. DISCUSSION

A. Base description

Keesler AFB is located on the shore of the Gulf of Mexico, in Biloxi, Mississippi. The base is an Air Training Command base, and the hospital is a tenant unit and a regional medical center which has 350 beds.

B. Current Disposal Practices and Limitations

The majority of the medical waste is collected, transported and ultimately incinerated by Browning Ferris Industries (BFI). The waste is picked up daily at the Medical Center and at the Dental Clinic. Approximately 600-700 pounds of medical waste is disposed of daily. The transporter collects the waste and provides the medical center with a copy of the manifest. After the waste is incinerated a final copy of the manifest is sent to the Medical Center. The hospital keeps these documents indefinitely. This contract costs 80,000 dollars per year. The contract does not include the disposal of RCRA hazardous wastes (such as U listed antineoplastic drugs).

Some medical waste and hazardous waste generated in process are discharged into the sanitary sewer. This sewage is collected and transported by gravity and pressure lines to the City of Biloxi, Wastewater Treatment Plant. The wastewater discharge limits are set by the Code of Federal Regulations Title 40 sections 261.3, 403, 433, 459, and 460 and Biloxi ordinance Number 1350.

Personnel from the clinical research laboratory burn all medical waste in an incinerator. All their acids are neutralized prior to discharge to a limestone filter, ensuring neutralization. The wastes then enter the sanitary sewer.

III. PROCEDURES

The first step of the survey was to review the hospital's hazardous and medical waste plan, infection control program, and the Bioenvironmental Engineer's hazardous chemical inventory. Numerous sections were then visited. Their procedures were observed, disposal practices were discussed, and survey forms were completed by shop personnel. Two types of survey forms were completed by hospital personnel. The sections completed a section survey form found in Appendix B that documented packaging, transporting, and weight of infectious waste. The facility manager filled out a separate form (Appendix C) that documented final disposition and costs of infectious waste. The survey forms documented medical waste disposal practices used in each section and are summarized in Appendix D.

The survey team visited and evaluated all hazardous waste accumulation and satellite sites. The following personnel were contacted about their involvement and responsibilities in the hospital hazardous waste program:

Margaret Sarver, Environmental Coordinator
Maj Jones, Bioenvironmental Engineer
Lt Hillman, Facility Manager

The medical waste storage area was also visited and evaluated by the survey team. The following personnel were contacted about their involvement and responsibilities in the medical waste program:

Col Heading, Environmental Health Officer
Lt Hillman, Facility Manager
Margaret Dennis, Infection Control Officer

IV. RESULTS AND DISCUSSION

A. Medical Waste Program

The current medical waste program is operating fairly well. The infection control officer is responsible for training all the hospital personnel on infection control. A summary of waste training is at Appendix E. The facility manager is responsible for medical waste disposal. The regulations on medical waste addressed all aspects of infection control and infectious waste disposal.

B. Hazardous Waste Program

The facility manager also manages the hospital's hazardous waste. Because these programs are so different, it may be better to assign responsibility to two different people. The medical logistics officer is already involved in the hazardous waste program because medical supply buys the material. Appointing him as the hazardous waste program manager will close this loop and allow the hospital more control over its hazardous waste program. A section-by-section summary of medical activities, clinical usage and disposal practices, and infectious waste segregation and disposal is at Appendix F.

V. SUMMARY OF WASTE DISPOSAL PRACTICES

A. Infectious Waste

1. Infectious waste is placed in red bags at the point of generation in all sections except the dental clinic. In the dental clinic the waste is placed on the technician trays until the end of the procedure. At this point it is placed in an infectious waste bag.

2. Housekeeping removes infectious waste at least once a day from all areas. Surgery and delivery have their infectious waste removed more frequently.

3. This waste is transported in carts, which are disinfected prior to transporting other materials.

4. Some sections hand carry their waste to a central storage area until housekeeping can collect it. These storage areas are disinfected at least twice a week according to housekeeping.

5. The infectious waste is collected by Browning Ferris Industry (BFI) and taken off the base to a privately owned incinerator. BFI collects 600-700 pounds of infectious waste a day from Keesler. The contract costs \$80,000 a year.

B. Hazardous Waste

1. Medical Supply tries to keep minimal amounts of all chemicals on hand for their customers. However, some sections have large amounts of chemicals, enough to last several months, within their sections.

2. Most of the hazardous waste generated is in small quantities, 1-gallon containers. These full containers are then turned into Facility Management for disposal.

3. Facility Management stores these chemicals at a hospital accumulation point until DRMO or a contractor can dispose of them. Being an accumulation point generates quite a bit of work and responsibility for the hospital. The hospital is not generating enough waste to warrant being an accumulation point.

VI. OBSERVATIONS AND CONCLUSIONS

A. Personnel seem to be confused about the difference between "medical waste" and "hazardous waste as defined by RCRA." The term "hazardous waste" has a specific legal definition which is defined in the 40 CFR Part 261. A solid waste is a hazardous waste if it is not excluded in 40 CFR 261.4(b) and it meets any of the following criteria:

1. It exhibits any of the characteristics of a hazardous waste.

2. It is listed in Subpart D and has not been excluded in any other section of the CFR. One of the more important exemptions that pertain to the hospital is 40 CFR Part 261.3(a)(E). This states that "Wastewater resulting from laboratory operations containing toxic (T) wastes listed in Subpart D, (is exempt) provided that the annualized average flow of laboratory wastewater does not exceed one percent of total wastewater flow into the headworks of the facility's wastewater treatment or pre-treatment system, or provided the wastes, combined annualized average concentration does not exceed one part per million in the headworks of the facility's wastewater treatment or pre-treatment facility." This means that the majority of the toxic hazardous wastes generated by the laboratories are not considered hazardous waste and can be discharged to the sanitary sewer if the chemicals are used in process.

3. It is a mixture of a listed waste and a solid waste solely because it exhibits a characteristic of a hazardous waste.

4. Several mixtures of a listed waste and a solid waste are not considered hazardous waste if discharged to a wastewater treatment plant regulated by the Clean Water Act.

B. Not all antineoplastic drugs are RCRA hazardous wastes. The Pharmacy plans to consider all antineoplastic drugs and materials associated with their preparation and administration containing greater than 3% of the container capacity to be hazardous waste. This practice will result in a greater quantity of antineoplastic drug waste being disposed of as hazardous waste. The Oncology Clinic disposes of all antineoplastic drugs and associated materials as medical waste. The Oncology Clinic does use several antineoplastic drugs which are a RCRA hazardous waste.

C. Sharps containers are generally located in each treatment room or in the rooms designated for injections. The Oral Surgery Clinic does not have a sharps container in each operatory.

D. Typically, housekeeping removes the regular trash and red-bagged waste from the point of generation. Several sections remove the wastes from individual rooms and transport them to a centralized location where housekeeping collects it. These centralized locations are also used to store dirty food trays until Food Services personnel retrieve them.

E. The hospital's definition of medical waste implies all wastestreams are medical waste. This creates some confusion over what is medical waste, hazardous waste, infectious waste, and routine waste.

F. Nuclear Medicine, Radiation Therapy, and the Genetics Laboratory are complying with the Nuclear Regulatory Commission requirements. The Genetics Laboratory could potentially have problems storing radioactive wastes due to the lack of storage space.

G. The Hospital Employee Health, Infection Control Policies and the Bloodborne Disease Prevention protocol meet the intent of the draft OSHA Bloodborne pathogen regulation.

H. The hospital laboratory is disposing of slides in the wastebasket.

VII. RECOMMENDATIONS

A. All excess chemicals which are not going to be used in the future should be disposed of properly. Chemicals which are RCRA hazardous wastes should be packaged according to 40 CFR 264.170. An inventory containing the type and quantity of each waste in the waste container must be maintained for each container. The waste can then be disposed of by a hazardous waste disposal contractor. Chemicals which are not RCRA hazardous waste can be either disposed of as municipal waste or discharged to the sanitary sewer system (whichever is appropriate).

B. Discuss the possibility of discharging small quantities of flammable chemicals (such as alcohol) which are used in process to the sanitary sewer system with Biloxi city officials.

C. The dust mist respirators contained in the antineoplastic spill kits are not adequate. OSHA recommends a full-faced organic vapor powered air purifying respirator with a high efficiency filter be used for a large antineoplastic drug spill response.

D. Sharps containers should be placed in each oral surgery operatory.

E. Housekeeping should be required to remove trash and red-bagged waste from each room instead of hospital personnel transporting it to a centralized location prior to housekeeping picking it up. This will save hospital personnel time, will help minimize spills, and will reduce the possibility of accidents.

F. Food trays should not be stored in the same area as red-bagged waste.

G. Red bags should be placed in infectious wastebaskets, not hung on IV poles, or laid on the floor.

H. The medical center does not produce a large quantity of hazardous waste. It is not beneficial to the medical center to establish a hazardous waste accumulation site. According to 40 CFR Part 264.34, each generating activity can accumulate up to 55 gallons of hazardous waste in the work area in an area designated as a satellite accumulation site. Keeping the waste in the immediate area will greatly reduce the hazardous waste management requirements.

I. Paper, cardboard, and plastic wrappers should not be red bagged. These should be disposed of in ordinary trash. Placing both trash cans and biohazardous cans in an area will allow segregation of the waste (especially in the laboratories).

J. All slides and other sharp items must be disposed of in a sharps container. They are considered infectious waste and could tear the plastic bags.

K. AFOEHL/EQE should be contacted to ensure the new incinerator plans for the Clinical Research Laboratory meet the requirements of the Clean Air Act.

L. SGA should examine the possibility of redistilling formaldehyde. The laboratory receives large quantities of samples preserved in formaldehyde daily. If the formaldehyde from these samples is filtered and redistilled, it can be reused. This will save the hospital acquisition money.

M. The medical center must develop a policy of antineoplastic disposal. The pharmacy's disposal practices meet the RCRA definition of empty. This policy is clear and could be implemented throughout the medical center.

VIII. CONCLUSIONS

Keesler AFB Medical Center has good initial infection control and hazardous waste programs. The base now needs to refine these programs. The programs currently overlap in many areas which causes confusion. The medical center needs to redefine these programs to remove this confusion. The emphasis in the medical center must be education and training.

REFERENCES

1. Agency For Toxic Substances and Disease Registry, "The Public Health Implications of Medical Waste: A Report to Congress," April 1990.
2. Environmental Protection Agency, "Guidelines for Infectious Waste Management," 1986.
3. 40 Code of Federal Registry part 261.

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Appendix A
Request Letter

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DEPARTMENT OF THE AIR FORCE
USAF MEDICAL CENTER, KEESLER (ATC)
KEESLER AIR FORCE BASE MS 39534-5300

REPLY TO
ATTN OF: KTTC/SGPB

4 January 1990

SUBJECT Request Assistance on the Medical Center's Hazardous Waste/Medical Waste Management Program

TO: HQ ATC/SGPB (Colonel Hadden)
AFOEHL/EQE (Captain McMullen)
IN TURN

1. The Keesler AFB Bioenvironmental Engineering (BEE) office requests assistance from the AF Occupational Environmental Health Laboratory (OEHL). We need assistance evaluating our Hazardous Waste Management Program to:

a. Define hazardous waste for better identification of chemicals in this category (waste characterization).

b. Verify areas designated as hazardous waste generators and assist with the identification and tracking of different waste streams.

c. Identify applicable regulatory standards.

d. Determine types of RCRA chemical categories.

2. Upon approval of this request the BEE office in conjunction with the Medical Center's Logistics office will coordinate OEHL's activities with those of the Idaho National Engineering Laboratory (INEL) to complete the management plan. -

WILLIE H. JONES, Major, USAF, BSC
Chief, Bioenvironmental
Engineering Services

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Appendix B
Section Survey Questionnaire

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DEPARTMENTAL SURVEY FORM

PLEASE COMPLETE AND RETURN THIS FORM TO THE INFECTION CONTROL NURSE BY _____.

DEPARTMENT : _____

CONTACT : _____ AUTOVON: _____

This form will be used to compile the following:

- (1) the specific locations where wastes are generated in the medical facility
- (2) how different types of wastes are segregated
- (3) if the wastes are treated in each section
- (4) how the wastes are packaged and labeled for disposal
- (5) the disposal methods used in each section

The following pages give the EPA's statutory definitions of seven types of regulated medical wastes. Please read each of the definitions carefully, decide which ones apply to your department, and then answer the following questions as completely as possible.

If you have any questions on filling out this form, please call Captain Albrecht or Lt Hedgecock at AV 240-3306.

SIGNATURE OF PERSON FILLING OUT THIS FORM _____

TRAINING

1. Have you ever received training in medical waste management?
____ YES ____ NO

2. Have the other personnel in this department been trained?
____ YES ____ NO ____ SOME

APPROXIMATE PERCENTAGE _____

3. How often does training occur? _____

4. Describe the training you recieved. _____

5. Have you ever seen or read the hospital's waste management

plan? ☐ YES ☐ NO

Have the other personnel? ☐ YES ☐ NO

APPROXIMATE PERCENTAGE _____

1. CULTURES AND STOCKS

Cultures and stocks of infectious agents and associated biologicals, including: cultures from medical and pathological laboratories; cultures and stocks of infectious agents from research and industrial laboratories; wastes from the production of biologicals; discarded live and attenuated vaccines; and culture dishes and devices used to transfer, inoculate, and mix cultures.

A. Describe the process(es) in which any of the above wastes are generated

B. Are the wastes treated (e.g., chemical or steam sterilization) in the area?

If so, describe the method of treatment?

C. Are the wastes segregated from other wastes generated in the area?

If so, describe the method of segregation.

D. How are the wastes packaged for disposal (What type of bags, boxes, etc.)?

E. Are the waste containers labeled before being removed from the area?

If so, describe the method of labeling.

F. How many times per day are wastes removed from this area?

G. What is the estimated daily poundage of wastes removed?

H. Who is responsible for removing wastes from the area, how are wastes transported from the area, and where are the wastes taken?

COMMENTS - PLEASE PROVIDE ANY ADDITIONAL INFORMATION THAT YOU FEEL MAY BE HELPFUL (USE THE BACK OF PAGE IF NECESSARY).

2. PATHOLOGICAL WASTES

Human pathological wastes, including tissues, organs, and body parts and body fluids that are removed during surgery or autopsy, or other medical procedures, and specimens of body fluids and their containers.

A. Describe the process(es) in which any of the above wastes are generated. _____

B. Are the wastes treated (e.g., chemical or steam sterilization) in the area? _____

If so, describe the method of treatment? _____

C. Are the wastes segregated from other wastes generated in the area? _____

If so, describe the method of segregation. _____

D. How are the wastes packaged for disposal (What type of bags, boxes, etc.)? _____

E. Are the waste containers labeled before being removed from the area? _____

If so, describe the method of labeling. _____

F. How many times per day are wastes removed from this area? _____

G. What is the estimated daily poundage of wastes removed? _____

H. Who is responsible for removing wastes from the area, how are wastes transported from the area, and where are the wastes taken? _____

COMMENTS - PLEASE PROVIDE ANY ADDITIONAL INFORMATION THAT YOU FEEL MAY BE HELPFUL (Use the back of page if necessary).

3. HUMAN BLOOD AND BLOOD PRODUCTS

(1) Liquid waste human blood; (2) products of blood; (3) items saturated and/or dripping with human blood; or (4) items that were saturated and/or dripping with human blood that are now caked with dried human blood; including serum, plasma, and other blood components, and their containers, which were used or intended for use in either patient care, testing and laboratory analysis or the development of pharmaceuticals. Intravenous bags are also included in this category.

A. Describe the process(es) in which any of the above wastes are generated. _____

B. Are the wastes treated (e.g., chemical or steam sterilization) in the area? _____

If so, describe the method of treatment? _____

C. Are the wastes segregated from other wastes generated in the area? _____

If so, describe the method of segregation. _____

D. How are the wastes packaged for disposal (What type of bags, boxes, etc)? _____

E. Are the waste containers labeled before being removed from the area? _____

If so, describe the method of labeling. _____

F. How many times per day are wastes removed from this area? _____

G. What is the estimated daily poundage of wastes removed? _____

H. Who is responsible for removing wastes from the area, how are wastes transported from the area, and where are the wastes taken? _____

COMMENTS - PLEASE PROVIDE ANY ADDITIONAL INFORMATION THAT YOU FEEL MAY BE HELPFUL (Use the back of page if necessary).

4. SHARPS

Sharps that have been used in animal or human patient care or treatment or in medical, research, or industrial laboratories, including hypodermic needles, syringes (with or without the attached needle), Pasteur pipettes, scalpel blades, blood vials, needles with attached tubing, and culture dishes (regardless of presence of infectious agents). Also included are other types of broken or unbroken glassware that were in contact with infectious agents, such as used slides and cover slips.

A. Describe the process(es) in which any of the above wastes are generated _____

B. Are the wastes treated (e.g., chemical or steam sterilization) in the area? _____

If so, describe the method of treatment? _____

C. Are the wastes segregated from other wastes generated in the area? _____

If so, describe the method of segregation. _____

D. How are the wastes packaged for disposal (What type of bags, boxes, etc.)? _____

E. Are the waste containers labeled before being removed from the area? _____

If so, describe the method of labeling. _____

F. How many times per day are wastes removed from this area? _____

G. What is the estimated daily poundage of wastes removed? _____

H. Who is responsible for removing wastes from the area, how are wastes transported from the area, and where are the wastes taken? _____

COMMENTS - PLEASE PROVIDE ANY ADDITIONAL INFORMATION THAT YOU FEEL MAY BE HELPFUL (Use the back of page if necessary).

5. ANIMAL WASTE

Contaminated animal carcasses, body parts, and bedding of animals that were exposed to infectious agents during research (including research in veterinary hospitals), production of biologicals, or testing of pharmaceuticals.

A. Describe the process(es) in which any of the above wastes are generated

B. Are the wastes treated (e.g., chemical or steam sterilization) in the area? _____

If so, describe the method of treatment? _____

C. Are the wastes segregated from other wastes generated in the area? _____

If so, describe the method of segregation. _____

D. How are the wastes packaged for disposal (What type of bags, boxes, etc.)? _____

E. Are the waste containers labeled before being removed from the area? _____

If so, describe the method of labeling. _____

F. How many times per day are wastes removed from this area? _____

G. What is the estimated daily poundage of wastes removed? _____

H. Who is responsible for removing wastes from the area, how are wastes transported from the area, and where are the wastes taken?

COMMENTS - PLEASE PROVIDE ANY ADDITIONAL INFORMATION THAT YOU FEEL MAY BE HELPFUL (Use the back of page if necessary).

7. UNUSED SHARPS

The following unused, discarded sharps: hypodermic needles, suture needles syringes, and scalpel blades.

A. How are the wastes packaged for disposal (What type of bags, boxes, etc.)? _____

B. Are the waste containers labeled before disposal? _____

If so, describe the method of labeling _____

COMMENTS - PLEASE PROVIDE ANY ADDITIONAL INFORMATION THAT YOU FEEL MAY BE HELPFUL.

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Appendix C
Facility Manager Survey

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FACILITIES MANAGEMENT SURVEY FORM

This form will be used to compile the following:

- (1) how different types of regulated medical wastes are segregated
- (2) how and where regulated medical wastes are stored before treatment and disposal
- (3) how the regulated medical wastes are packaged and labeled for disposal
- (4) how the regulated medical wastes are disposed

If you have any questions on filling out this form, please call Captain Albrecht or Lt Hedgecock at AV 240-3306.

SIGNATURE OF PERSON FILLING OUT THIS FORM _____

1. How is the medical waste treated and disposed? _____

2. Estimated pounds of medical waste produced per month _____
3. Estimated cost to dispose of medical waste per month _____
4. Is the waste disposed of _____ off-site _____ on-site
5. Are different types of medical waste segregated before treatment or disposal? _____ YES _____ NO _____ SOMETIMES

WHICH ONES? _____

6. If off-site, how is the waste transported to the site?
_____ base personnel _____ contractor

If by contractor, what is the name, address, and the telephone number of the contractor? _____

Is the contractor permitted by the EPA? _____ NO _____ YES

If yes, what is the permit number? _____

7. If the waste is treated off-site, how is it packaged before transporting off-site? _____

Are the containers

- _____ Rigid?
_____ Leak-resistant?
_____ Impervious to moisture?
_____ Of sufficient strength to prevent tearing or bursting under normal conditions of use and handling?
_____ Sealed to prevent leakage during transport?

8. Are any medical waste containers labeled?

_____ YES _____ NO _____ SOMETIMES

WHICH ONES? _____

What type of information is included on the label? _____

Are the containers marked with the biohazard symbol? _____

9. If the waste is disposed of onsite by incineration, complete the following questions.

Total number of incinerators _____

Age of each incinerator _____

Capacity of each incinerator _____

Permit Number _____

Approximate down time per month _____

Type of stack testing done and frequency _____

Type of ash testing and frequency _____

Operating Cost (including fuel consumption and maintenance) _____

10. Does the hospital have a waste management plan? ☐ YES ☐ NO

11. Are facilities management employees trained in medical waste management? ☐ YES ☐ NO ☐ SOMETIMES

WHICH ONES? _____

HOW OFTEN? _____

12. Is this medical facility subject to any regulatory requirements other than EPA requirements? ☐ YES ☐ NO

WHICH ONES? _____

13. Does this medical facility utilize any recordkeeping practices? ☐ YES ☐ NO ☐ SOME

How is this done? _____

14. Does this facility accept any regulated medical waste from sections that are not co-located with the hospital or off-site? ☐ YES ☐ NO

If yes, list below the facilities and the approximate distances to these facilities and how the waste is transported.s.

SITE

DISTANCE (miles)

TRANSPORTOR

TREATMENT AND DISPOSAL OF MEDICAL WASTES

C	P	B	S	A	I	U
U	A	L	H	N	S	N
L	T	O	A	I	O	U
T	H	C	R	M	L	S
/	O	D	P	A	A	E
S	L	/	S	L	T	D
T	O	P			I	
O	G	R			O	S
C	I	O			N	H
K	C	D				A
	A					R
	L					P
						S

ON-SITE TREATMENT

A. INCINERATION

B. AUTOCLAVING

C. CHEMICAL
TREATMENT

D. GRINDING

E. OTHER

ON-SITE DISPOSAL

A. INCINERATION

B. BURNING ON-SITE

C. BURIAL ON-SITE

D. INTO SEWER OR
SEPTIC TANK

E. OTHER

OFF-SITE TREATMENT & DISPOSAL

A. PICKED UP WITH
OTHER SOLID
WASTE

B. UNDER CONTRACT
WITH MEDICAL
WASTE HAULER

C. TREATED OFF-SITE

D. LANDFILLED OFF-SITE

E. SENT TO RENDERING
PLANT

F. OTHER

Appendix D
Summary of Infectious Waste By Type

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**Disposal of Blood, Pathological
and Culture Infectious Wastes**

<u>Section</u>	<u>Quantity of Blood Waste</u>	<u>Quantity of Pathological Waste</u>	<u>Quantity of Cultures and Stocks Waste</u>
Surgery suite	N/A	Sent to Lab	50 Lb/day
SGHG	N/A	N/A	N/A
Nursery	Sent to Lab	Sent to Lab	2 Lb/day
Labor & Del	N/A	10 Lb/day (Placentas)	5 Lb/day
Surgery Clinic	N/A	Sent to Lab	3 Lb/day
Ward 4B	N/A	Infrequently	Thrown in Trash
Oral Surgery	Sent to Lab	Sent to Lab	10-15 Lb/day
Rad Therapy	N/A	N/A	N/A
Ward 5B	N/A	N/A	5 Lb/day
OB-Gyn Clinic	N/A	N/A	N/A
Ward 3A	N/A	Sent to Lab	40 Lb/day into sewer
Allergy Clinic	1 Lb/day	N/A	N/A
Pediatric Ward	N/A	N/A	40 Lb/day into sewer
Occ Therapy	N/A	N/A	N/A
Genetic Lab	N/A	2 Lb/day in phenol	2 Lb/day
Clinical Research	1 Lb/day (sterilized)	N/A	N/A
Blood Bank	N/A	N/A	15 Lb/day
Dental Clinic	N/A	1 Lb/day	4 Lb/day
Med Procedure	N/A	N/A	N/A
Emergency Serv	N/A	N/A	20 Lb/day
Radiology	N/A	N/A	N/A

**Disposal of Isolation Waste, Used and
Unused Sharps, and Who Transports It**

<u>Section</u>	<u>Quantity of Used Sharps</u>	<u>Quantity of Unused Sharps</u>	<u>Quantity of Isolation Wastes</u>	<u>Removed by</u>
Surgery suite	10 Lb/day	In with Sharps	N/A	Housekeeping
SGHG	10 Lb/mo	In with Sharps	N/A	Housekeeping
Nursery	2 Lb/day	In with Sharps	5-10 Lb/day	Housekeeping
Labor & Del	2 Lb/day	In with Sharps	2 Lb/day	Housekeeping
Surgery Clinic	10 Lb/mo	In with Sharps	N/A	Housekeeping
Ward 4B	10 Lb/mo	In with Sharps	N/A	Housekeeping
Oral Surgery	1 Lb/day	N/A	N/A	Housekeeping
Rad Therapy	N/A	N/A	N/A	Housekeeping
Ward 5B	N/A	N/A	N/A	Housekeeping
OB-Gyn Clinic	1-5 Lb/day	In with Sharps	N/A	Housekeeping
Ward 3A	20 Lb/day	In with Sharps	20 Lb/day	Housekeeping
Allergy Clinic	20 Lb/day	N/A	N/A	Clinic
Pediatric Ward	2-3 Lb/day	In with Sharps	10 Lb/day	Housekeeping
Occ Therapy	N/A	N/A	N/A	Housekeeping
Genetic Lab	10 Lb/week	In with Sharps	N/A	Housekeeping
Clinical Research	1 Lb/day	In with Sharps	N/A	CRL Personnel
Blood Bank	N/A	N/A	N/A	Housekeeping
Dental	1 Lb/day	In with Sharps	1 Lb/day	Housekeeping
Med Procedure	2-5 Lb/day	N/A	N/A	Housekeeping
Emergency Serv	10-15Lb/day	In with Sharps	N/A	Housekeeping
Radiology	N/A	N/A	N/A	Housekeeping

Appendix E
Summary of Waste Training

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Training

Section	% Trained	% Reviewed Hospital's Waste Plan	Training Frequency
Surgery suite	100%	0%	Daily
SGHG	100%	0%	Annual
Nursery	100%	0%	Annual
Labor & Del.	5%	0%	Once
Surgery Clinic	0%	0%	Never
Ward 4B	100%	0%	Annual
Oral Surgery	0%	0%	Never
Rad Therapy	20%	0%	Annual
Ward 5B	100%	100%	Annual
OB-Gyn Clinic	10%	0%	Initial
Allergy Clinic	100%	0%	Annual
Ped Ward	100%	100%	Initial
Occ Therapy	0%	0%	Annual
Genetic Lab	0%	0%	Annual
CRL	100%	0%	Annual
Blood Bank	0%	0%	Annual
Dental	95%	0%	Annual
Med Procedure	0%	0%	Never
Emergency Serv	95%	0%	Annual
Radiology	5-10%	N/A	Annual

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Appendix F

Section Activities and Waste Disposal Practices

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SECTION ACTIVITIES AND WASTE DISPOSAL PRACTICES

This is a section-by-section summary of medical activities, chemical usage and disposal practices, and infectious waste segregation and disposal. All infectious waste is transported to a central storage room, until the contractor collects it. All hazardous material is turned into facility management personnel, who store it at a hospital accumulation point until collected by a contractor or DRMO.

Section: Gyn Surgery Ward

This ward mainly treats hysterectomy patients, D & C patients, and patients going to nursing homes. It has five isolation rooms, but only two work. Sharps containers are in all patient rooms, and all red-bag waste is double bagged. There are only red bags in the rooms. Housekeeping removes all trash from the patient's rooms, except for patients receiving radiation therapy. Radiation therapy stores this waste until it is no longer radioactive and then disposes of it.

Section: ICU/CCU/SCU Ward

This ward treats all intensive and coronary care patients. They average one chemotherapy patient a month. Either the physician or a nurse from the oncology ward administers the antineoplastic drugs. The nurses always wear gloves. This ward has no isolation rooms. Suction canisters are emptied in the toilet and the canisters thrown away. The ward generates three to five red bags a day. All dialysis waste is red bagged. All red bags are in cans.

Section: Labor and Delivery Ward

This ward treats approximately 90 patients a month. They generate three red bags of waste during each delivery, excluding labor. Anything with body fluids on it is red bagged. Personnel do not differentiate between infectious and non-infectious patients, and would not double glove if delivering a child from a known infectious patient. All infectious waste is placed in a red bag located in a rigid container.

Section: Medical Surgery Ward

This ward treats post-operative patients, usually total knee and hip replacements. Personnel do not administer antineoplastic drugs, nor does the ward have any isolation rooms. They normally do not have any infectious patients, and if they do the patients are identified before they are admitted to the ward. The staff uses universal body precautions. Typically the only red-bagged items are dressing changes and syringes. There is a sharps container in every room. This ward generates one or two red bags a day.

Section: Nursery Ward

Any infant with a wound or whose mother is known to have an infectious disease, is considered infectious. All waste with body fluids, including diapers is considered infectious. The infectious waste bags are placed on the

floor or tied to the IV pole near the infant. The ward only generates one partially full red bag a day. There are sharps containers in the nursery, but not at each infant's location.

Section: Oncology Ward

This ward treats many terminally ill patients. Most of these patients receive antineoplastic drugs in their rooms. These patients are not placed in isolation rooms, but are identified and all their waste is red bagged. The nurses administer five to seven chemotherapy injections into the IV tubing after it is primed with IV fluid. The waste from the chemotherapy treatment is segregated and identified as antineoplastic waste. No specific policy exists for separating the antineoplastic drugs that are RCRA-listed hazardous waste from the other antineoplastic drugs.

Section: Pediatrics Ward

This ward treats all children who are hospitalized, including children with cancer. It averages one patient on antineoplastic drugs a day. These shots are premixed by the pharmacy and administered directly (pushed) by the physicians. All shots are administered within 24 hour or returned to the pharmacy. The chemotherapy patients stay in isolation rooms. All the waste is red bagged and the linen is marked as isolation linen. The linen and red bags are removed by medical personnel and placed in a utility room where housekeeping retrieves them.

Section: Surgery/Urological Ward

This 42-bed ward mainly treats abdominal surgery, ear, nose and throat, and dental surgery patients. All patients are considered infectious and universal precautions are taken. All dressings are red bagged; all other waste goes in the trash. The medical staff removes these infectious waste bags to a dirty utility room. The waste is stored in this room with the dirty food trays until housekeeping and food service collects their respective items. (This area also has a specimen refrigerator that needs to be labeled for biohazard storage.)

Section: Allergy Clinic

Contact: TSgt Will

This clinic treats 400 patients a week with allergies, and gives 100 immunizations a week. During flu season this number increases to 150 a day. The only infectious waste generated is needles and vials. All of these are placed in sharps containers. There is one container in each injection room.

Section: Blood Bank

This laboratory generates one small bag of medical waste every three weeks. All the expired blood components are incinerated. The waste from washing cells goes down the drain. All spills are red bagged. This laboratory has no chemicals.

Section: Clinical Laboratory
Contact: Lt Col Root

This section does 32 chemical analyses. All reagents are mechanically placed in plastic tubing and disposed of as a biohazard. Serum and blood products are also red bagged. In bacteriology all the plastics and media are placed in biohazard bags. The blood stains, urine samples and the majority of the buffers go down the drain. I^{125} samples also go into the sanitary sewer after they have decayed. The laboratory disposes of approximately 50 microcuries a month. This section uses minimal amounts of acids.

The Hematology Laboratory uses minimal amounts of chemicals. However, they have old chemicals that must be disposed of properly. The Cytology Laboratory mainly uses Clearite as a cell fixative. Clearite is currently bottled and disposed of as a hazardous waste due to its flashpoint, 74°F. The Histology Laboratory also uses 40% Clearite 3 and Formalin.

Section: Dental Clinic
Contact: MSgt Lockett

The dental clinic has 48 dentists assigned who treat approximately 600 patients every day. The clinic is divided into ten suites. The dental clinic considers all blood soaked gauze infectious waste. There are sharps containers in all areas.

The dental laboratory also has several chemicals which are disposed of as hazardous waste including ethyl alcohol (ignitable), and Vapo-steril (ignitable). The dental x-ray department collects and labels all fixer (approximately 10 gallons a month) as hazardous waste. This waste is then transported to the hospital in a government vehicle, and processed through the silver recovery unit in radiology.

Section: Dermatology
Contact: Major Libow

This clinic performs minor surgical procedures. All injections are given in a central area where the sharps containers are located. All gauze and cotton-tip applicators are red bagged. Personnel use liquid nitrogen and Formalin which is used to preserve specimens; they don't dispose of it. The clinic treats 20 patients a day and generates less than one red bag a day.

Section: Ear, Nose and Throat Clinic
Contact: SSgt Coon

This clinic treats ear, nose, and throat disorders. The clinic primarily administers diagnostic hearing checks. Some invasive treatments are done, including sinus cleans. The body fluids are red bagged and approximately one infectious waste bag a day is generated. The clinic treats 40 to 50 patients each day. There is a sharps container in each examining room.

Section: Emergency Room
Contact: MSgt Carstens

The Emergency Room treats approximately 100 patients a day. Approximately 5% of these are multiple trauma cases. When treating these patients, the staff wear gloves, gowns, masks, and goggles. The remainder of their patients are overflow from the primary care clinic. All blood and body fluids are considered infectious which generates about one red bag a week. There are sharps containers in all the exam rooms.

Section: General Procedures Clinic
Contact: Major Gentry

This clinic treats several patients with antineoplastics on an out-patient basis. The staff places the vial in a zip-lock bag, which goes into a red, infectious waste bag which the staff say is disposed as chemotherapy waste. However, housekeeping was not aware that this red bag was different from the others.

Section: Genetics Laboratory:

This laboratory uses a DNA synthesizer and extractor. It generates approximately 1 gal/mo acetonitrite and cyanide compounds. The DNA extractor uses phenol chloroform, which is a U-listed hazardous waste and an ethidium bromide solution. Personnel also use P^{32} radioisotopes, which are stored until they are no longer radioactive. There is very limited storage space for radioactive waste.

Section: General Surgery Clinic
Contact: SSgt Jensen

This surgery unit performs all types of minor surgery, including endoscopy, and general outpatient surgery. Everything in general surgery is red bagged except for the outer packaging (ie., bandage wrappings). The surgery personnel wear scrubs, hair nets, and shoe covers. If there is a potential for splashing, personnel wear eye goggles. Three or four surgical procedures are done a day. There is a sharps container in each room. The surgery personnel would not know if a person had an infectious disease unless it was noted in his chart.

Section: Housekeeping
Contact: Kevin Sizelove

Housekeeping is responsible for transporting all waste within the facility. The infectious waste on some floors is stored in a utility room until Housekeeping can take it downstairs to the utility room. Carts are used to transport the waste to a storage room and are cleaned after each use. All rooms where infectious waste is stored should be mopped daily and cleaned with germicide. Housekeeping is also responsible for cleaning up infectious waste spills with a phenolic compound.

Housekeeping is not responsible for chemical spills, the hospital spill response team is. Housekeeping personnel transport the antineoplastic waste in labeled boxes. Gloves are available, however; the majority of the personnel do not wear them.

Housekeeping believes there is quite a problem with segregation. Personnel have found blood and other infectious waste in the trash.

Section: Medical Procedures Clinic
Contact: SSgt Bernhardt

This section performs 3,000 procedures a year. These procedures include upper and lower endoscopies and brachoscopies. There is no infectious waste generated, unless the patients are known to be infectious. The medical procedures staff should always know if the patient is infectious.

Section: Medical Pulmonary Laboratory
Contact: MSgt Beard

This clinic treats mainly heart and lung diseases, due to smoking and environmental causes. Personnel do diagnostics and biopsies in the procedure lab. Nonevasive cardiac stress testing is also conducted. Normally, this section does not generate infectious waste other than needles. There may be four or five procedures a month that generate any infectious waste. If it is saturated with blood, it is red bagged. All needles are placed in sharps containers.

Section: Nuclear Medicine Clinic
Contact: TSgt Lansford

This section administers radionuclides. All radioisotopes are delivered from and returned to the radionuclide pharmacy in a lead pig. Several isotopes can be administered including Technetium⁹⁹ (6-hour half-life), Thallium²⁰¹ (72-hour half-life), Gallium⁶⁷ (71-hour half-life), I¹³¹ (8-day half-life and is only administered in capsules), and Xenon gas. When the lead pig is returned to the pharmacy, nuclear medicine surveys the outside of the box to verify it is below background. The clinic is licensed for all their isotopes.

The clinic treats between 15 and 18 patients a day. Typically, this section generates between two and seven gallons of infectious waste each week and one small sharps container a week. This waste is stored in a lead pig until it is no longer radioactive. It is then disposed of as infectious waste.

If a patient requires over 30 microcuries of I¹³¹, the patient is hospitalized. All the floors and walls are papered. The patient can't leave his room for 36 to 48 hours. All waste from these rooms is collected and stored until it is no longer radioactive. The nuclear medicine section only has eight or nine of these cases a year.

Section: Neurosurgery Clinic

Neurosurgery does all their procedures in surgery; therefore, their waste is included with surgery's.

Section: OB/Gyn

Contact: TSgt Shoemaker

This clinic treats approximately 350 patients a day. It does not generate infectious waste routinely. The clinic normally does cervix freezing, pap smears, colcoscopy, and, occasionally, a biopsy. All injections, usually B-12 or penicillin, are given in a central injection area which has a sharps container.

Section: Occupational Therapy Clinic

This clinic works with mental health, pediatrics, and physically handicapped patients to help them develop new skills. This clinic does not generate any medical waste and only uses small amounts of chemicals. The majority of these chemicals will not be a hazardous waste. However, only minimal amounts should be kept on hand.

Section: Oral Surgery

Contact: MSgt Simcox

All infectious waste is carried from the operatory to the sterilizing room. This area generates about one red bag a day. There is one sharps container in the area. The technicians carry the needles to the container, across an open hallway. There is an X-ray developer in this section. They use approximately five gallons a month of both x-ray fixer and developer.

Section: Pharmacy

Contact: Col Ross and Lt Stark

The pharmacy is responsible for issuing all medications to the wards and outpatients. The staff mixes antineoplastics in a biological safety cabinet wearing gowns and gloves. The antineoplastic medications that were on hand were Adiamycin, ARAC, Cisplatin, Cerubidine, Cytotoxin, Dactinomycin, 5-FU, Leucovorin, Methotrexate, Mutamycin, Novantrone, Paraplatin, and VP-16. The pharmacy has two bags for chemotherapy waste: one for slightly contaminated waste, disposed of as infectious waste and the other for very contaminated waste, disposed of as hazardous waste.

Section: Plastic Surgery Clinic

Plastic surgery procedures are all done in surgery, therefore, their waste is included with surgery's.

Section: Physical Therapy Clinic

This ward does minimal wound and burn care while they administer physical therapy. Normally, only one patient per month requires this treatment. During this patient's therapy, the clinic would generate one partially filled red bag a day.

Section: Primary Care
Contact: MSgt Fordemwalt

This clinic treats between 300 and 350 patients a day, usually for cold, flu, and similiar illnesses. It generates very little infectious waste. On waste from a known infectious patient is red bagged. All injections are giv in a central injection room. This clinic generates no hazardous waste.

Section: Radiation Therapy Clinic

This clinic currently has no radioactive sources. It uses linear accelerators and x-ray machines. All fixer from x-rays is drummed and brought to the x-ray department for silver recovery. This section does not generate any medical or hazardous wastes.

Section: Surgery Department

This section preforms all types of surgery including open-heart surgery. The staff treats patients as infectious and wear gowns, gloves, masks, and possibly goggles for all surgeries. The staff segregate their waste; all preop waste goes in the trash. All waste generated after the surgery begins is red bagged. All body parts go to pathology. A routine surgery generates about five bags. This section generates approximately 500 bags a month.

Section: X-Ray Department
Contact: MSgt Breon and TSgt Powers

This section uses 100 gallons of developer and 150 gallons of fixer per month. The department has two electrolytic processing units. The section also runs all the developer from the dental x-ray and the clinical research laboratory through their processing units. The developer is bottled and labeled with hazardous waste labels (these containers do not need hazardous waste labels).

Section: Clinical Research Laboratory, Analytical Laboratory Section
Contact: Capt Millelson

This laboratory conducts several different types of research using a wide variety of chemicals. However, they have numerous expired chemicals, duplicate chemicals and chemicals they no longer need on hand. These chemicals should be disposed of. The laboratory drains run through a limestone pit before they enter the sanitary sewer; this ensures they are neutralized.

Section: Clinical Research Laboratory, Veterinary Section
Contact: Dave Carlton

This section occassionally uses hazardous chemicals in their laboratory. When personnel use hazardous chemicals on the animals, they follow written procedures. The clinic does have an x-ray machine which uses less than five gallons a month of both fixer and developer. The used fixer is drummed and taken to either DRMO or the hospital's waste program manager.

This section also operates a very small two-chamber incinerator. It emits no visible smoke and operates at 1800°F in both chambers. It is used for animal and associated waste from the research laboratory. Occasionally outdated medication or classified paper is burned in it.

The NRC regulations for radioactive materials are followed with all animals that have been injected with radionuclides. If the half-life is greater than 60 days, the radioactive materials decay in storage for 10 half-lives and then they are incinerated.

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